

E-CIGARETTES: THE FACTS, FUN, FALLACIES, & FUTURE

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Outline:

- The FACTS:
 - What is an e-cigarette? How do they work?
- The FUN:
 - Trends in e-cigarette use
- The FALLACIES:
 - Current research on e-cigarettes
- The FUTURE:
 - E-cigarette laws and policies

THE FACTS

What is an E-cigarette?

- **Electronic Nicotine Delivery System (ENDS)**- products that do not burn tobacco leaves but rather vaporize a nicotinic solution that is then inhaled
 - Types:
 - Electronic Cigarettes (aka E-Cigarettes)
 - Vape pens
 - E-hookah
 - Personal vaporizers
- Same function
 - Heat a liquid solution with nicotine
- Same components
 - Power Source (battery)
 - E-Liquid (typically contains nicotine)
 - Atomizer

NOTE:

E-cigarettes are the most common type of ENDS product; we will be discussing “E-cigarettes” but this category frequently includes the other forms of ENDS as well.

Types of E-Cigarettes





Product	Description	Some Brands
Disposable e-cigarette 	Cigarette-shaped device consisting of a battery and a cartridge containing an atomizer to heat a solution (with or without nicotine). Not rechargeable or refillable and is intended to be discarded after product stops producing aerosol. Sometimes called an e-hookah.	NJOY OneJoy, Aer Disposable, Flavorvapes
Rechargeable e-cigarette 	Cigarette-shaped device consisting of a battery that connects to an atomizer used to heat a solution typically containing nicotine. Often contains an element that regulates puff duration and /or how many puffs may be taken consecutively.	Blu, GreenSmoke, EonSmoke
Pen-style, medium-sized rechargeable e-cigarette 	Larger than a cigarette, often with a higher capacity battery, may contain a prefilled cartridge or a refillable cartridge (often called a clearomizer). These devices often come with a manual switch allowing to regulate length and frequency of puffs.	Vapor King Storm, Totally Wicked Tornado
Tank-style, large-sized rechargeable e-cigarette 	Much larger than a cigarette with a higher capacity battery and typically contains a large, refillable cartridge. Often contains manual switches and a battery casing for customizing battery capacity. Can be easily modified.	Volcano Lavatube

Figure 1. Examples of different electronic cigarette (e-cigarette) products. Reproduced from Grana et al.¹

(Grana, Benowitz, & Glantz, 2014)

Other E-Products

E-hookah



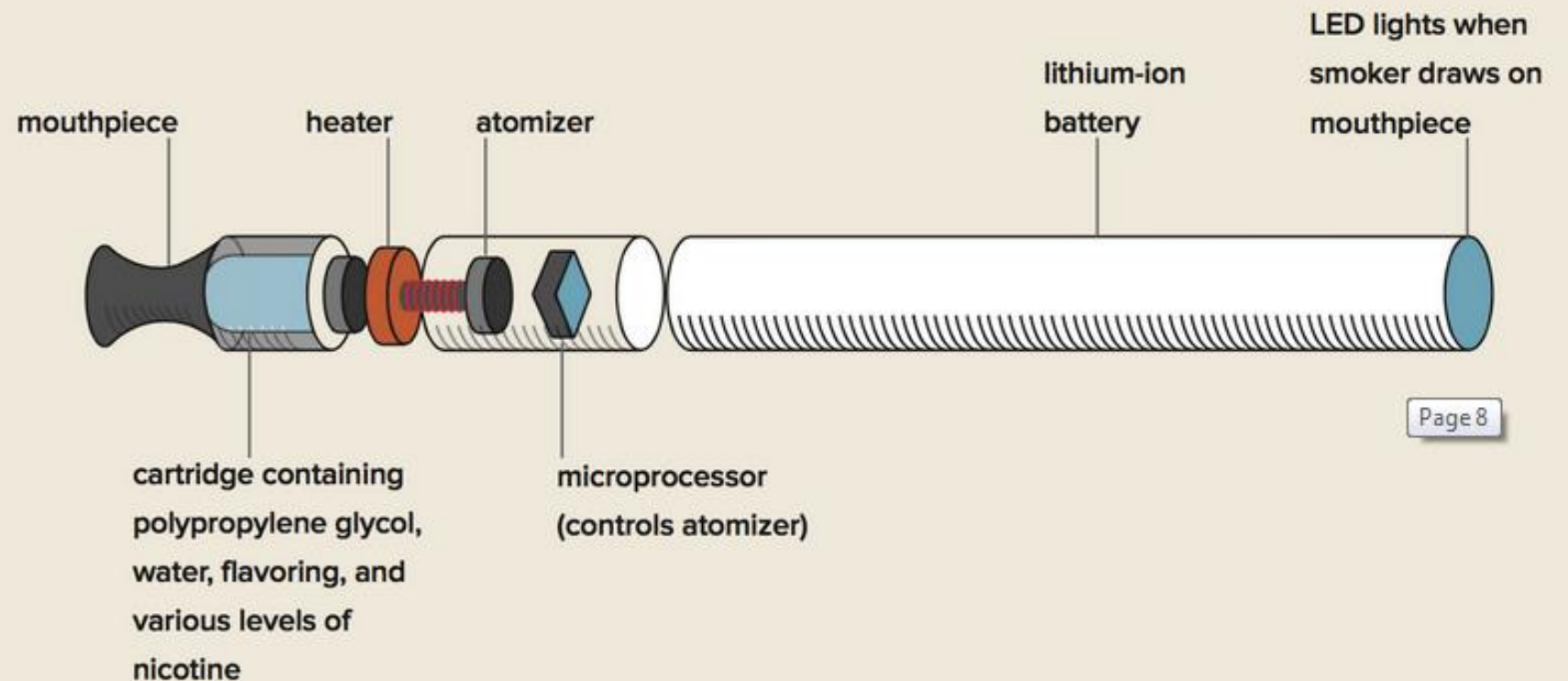
E-Pipes



How do E-Cigarettes Work?

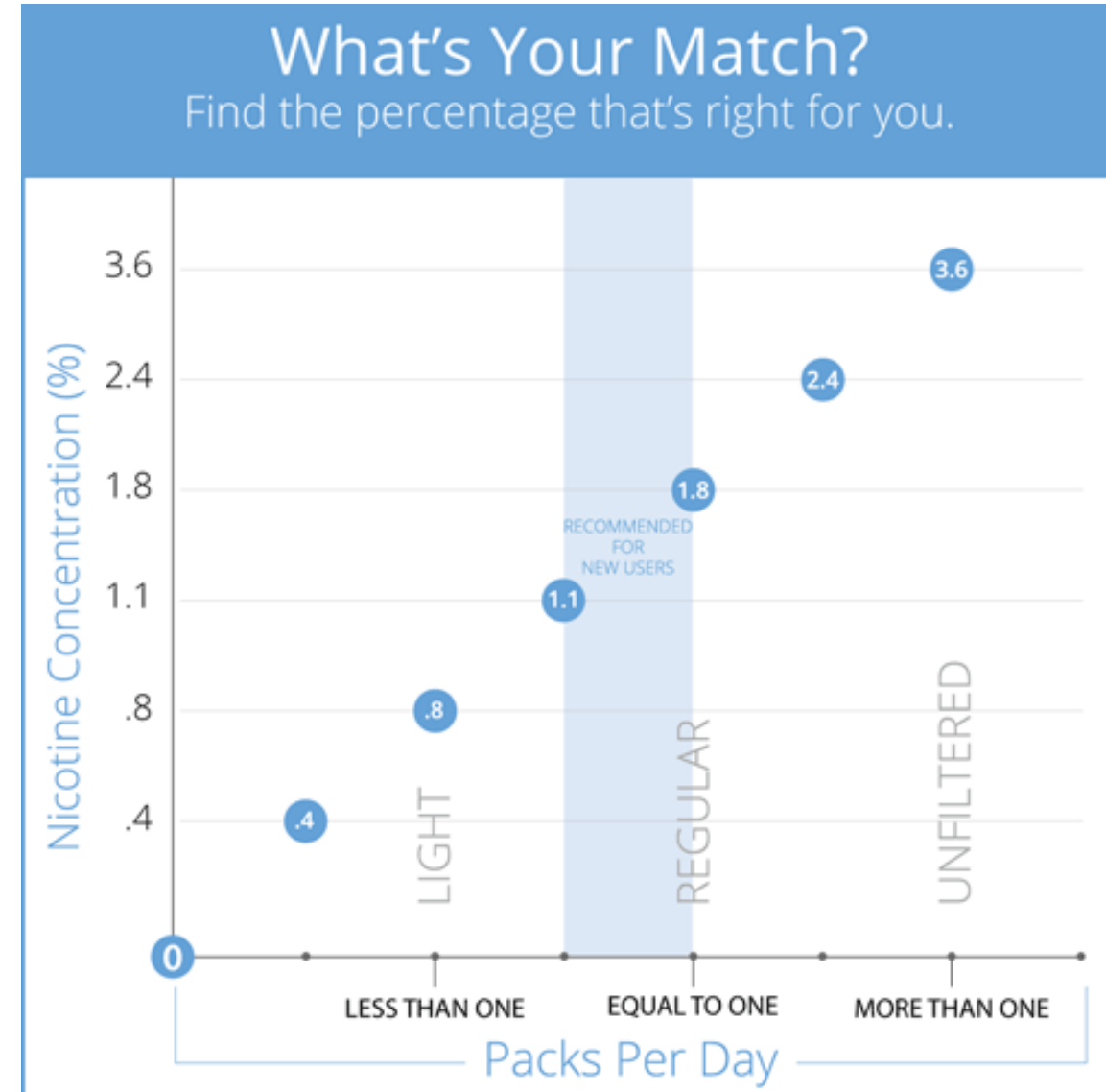
HOW A COMMON E-CIGARETTE WORKS

1. User inhales from the mouthpiece, turning on the device and activating the LED light.
2. Battery sends charge to the atomizer and heater, which vaporize liquid from replaceable cartridge, producing flavored, nicotine-containing vapor, which is consumed and exhaled by the user.



Nicotine Concentrations in E-Cigarettes

- On average, a traditional cigarette contains between 8-20 mg of nicotine, whereas *only* 1mg is actually absorbed.
- The absorption of nicotine from e-cigarettes is less clear; estimates suggest that 50% of the nicotine is absorbed.



E-cigarette Use Among Adults (2012)

INCREASE IN E-CIGARETTE AWARENESS AND USE

A 2012 NATIONALLY REPRESENTATIVE
SAMPLE OF U.S. ADULTS FOUND:

67% OF ADULTS
HAVE HEARD
OF E-CIGARETTES

8% OF ADULTS
HAVE USED
E-CIGARETTES

57% OF ADULTS ARE UNCERTAIN
ABOUT THE POTENTIAL
HARMS OF E-CIGARETTES

SALES of e-cigarettes in the U.S.
DOUBLED in 2012 to approx.
\$400 MILLION and is expected
to **DOUBLE** again in 2013

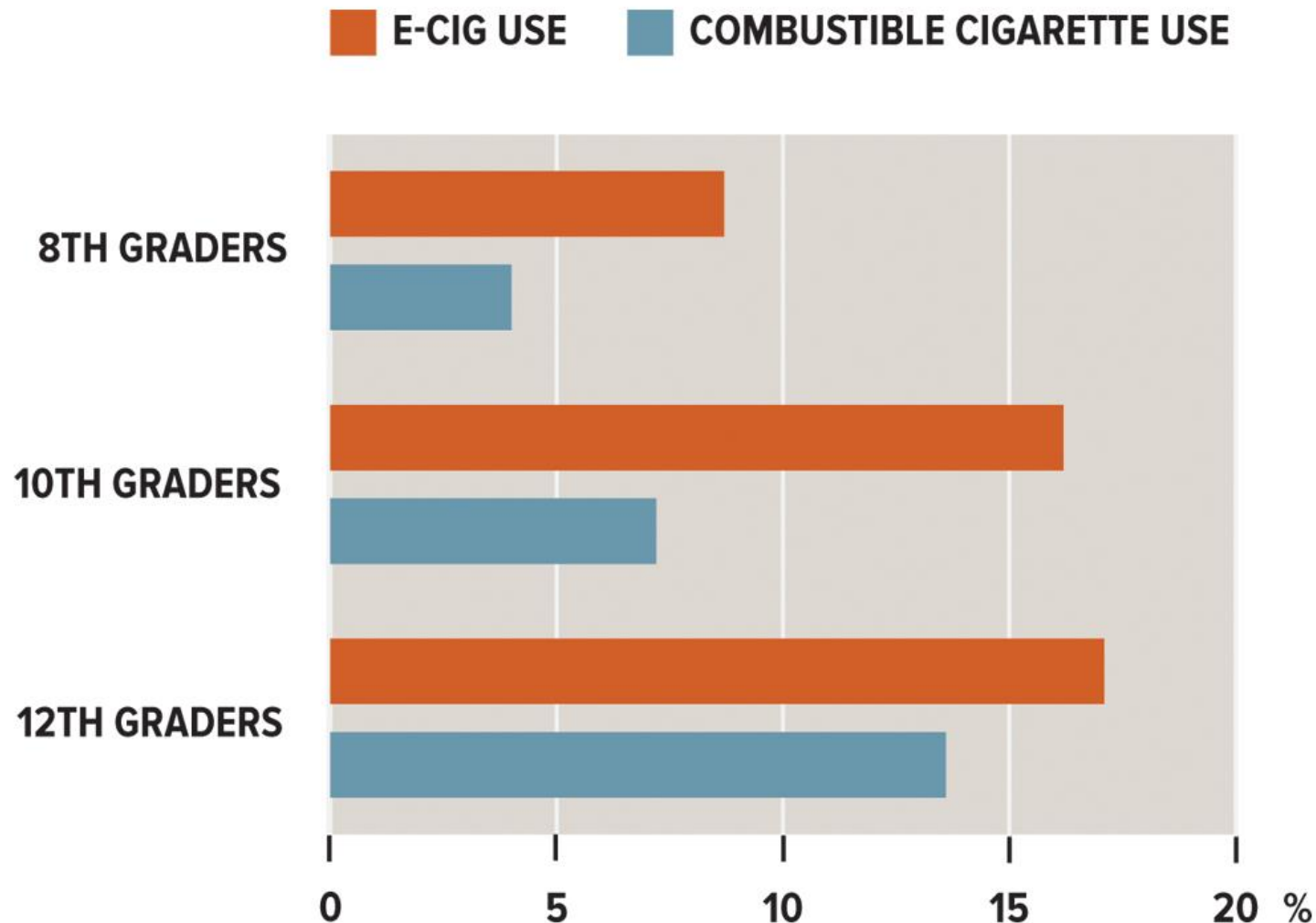
MARKET
PROJECTIONS

The e-cigarette **MARKET** is
worth **\$2 BILLION** globally

E-cigarette Use Among Adults (2014)

- Among adult current cigarette smokers:
 - 53.6% ever used e-cigarettes
 - 21.5% were currently using e-cigarettes
- Among adult former smokers:
 - 6.4% ever used e-cigarettes
 - 1.6% were currently using e-cigarettes

E-cigarette Use Among Youth



From 2013 to 2014

- Among **high school** students, e-cigarette use almost tripled (4.5% to 13.4%)
- Among **middle school** students, e-cigarette over tripled (1.1% to 3.9%)
- E-cigarette use now surpasses rates of any other tobacco product used among youth

Reasons for E-Cigarette Use Among Adults

- **Cessation:** 17.1% of e-cigarette users cited “can help me quit” as their main reason for using e-cigarettes
- **Circumventing Restrictions:** 18.5% of disposable & cartridge users & 9.9% of tank users cited “can be used where smoking isn’t allowed” as their main reason for use
- **Cheaper:** 14.7% of tank users & 4.0% of disposable & cartridge users cited “they cost less” as their main reason for e-cigarette use
- **Flavors:** 9.1% of young adults (aged 18-24) cited “they come in flavors I like” as their main reason for e-cig use; 1.3% of 25+ year olds cited this reason

FACTS: Conclusions

- E-cigarettes deliver nicotine through vapor rather than by burning tobacco leaves
- Use of e-cigarettes is rising dramatically in both adults and youth
- E-cigarettes are not *just* being used to quit smoking:
 - Avoid Smoke-free laws
 - Cheaper
 - Flavors

THE FUN

Tobacco Company Presence in E-Cig Market

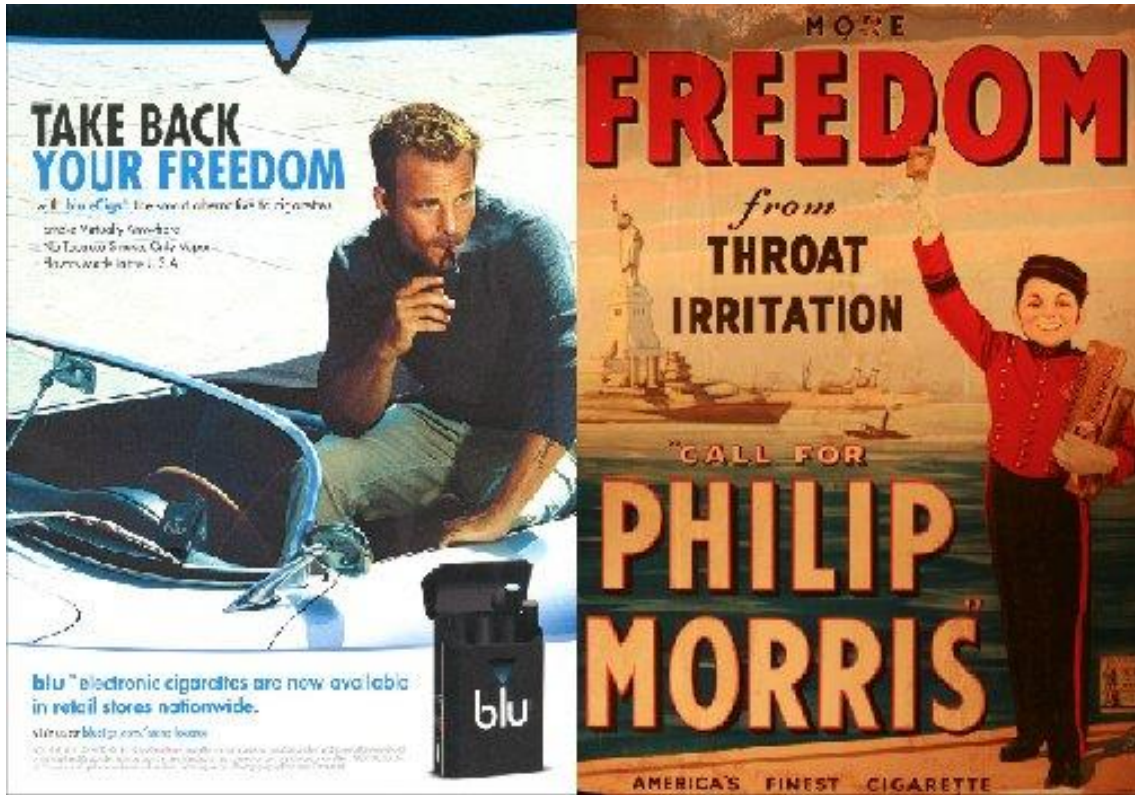
Table 3. Tobacco Companies That Have Acquired or Created E-Cigarette Companies and Brands (as of January 2014)

Tobacco Company	Acquired E-Cigarette Company	E-Cigarette Brand(s)
Altria Inc	GreenSmoke	Mark Ten
Reynolds American Inc	No	Vuse
Lorillard	Blu Cigs, Inc	Blu
British American Tobacco	CN Creative	Vype
Imperial Tobacco	Dragonite Holdings Ltd	Ruyan
Swisher	No	E-Swisher

E-cigarette indicates electronic cigarette.



The Advertisements



TAKE BACK YOUR FREEDOM
with blu eCigs. The new e cigarette for the 21st century.
Smooth. Virtually Smokeless.
No Tobacco Smell. Only Vapor.
Rechargeable. In the U.S.A.

blu™ electronic cigarettes are now available in retail stores nationwide.
visit www.bluecigs.com for more info.

blu

FREE
FREEDOM
from
THROAT IRRITATION
"CALL FOR
PHILIP MORRIS
AMERICA'S FINEST CIGARETTE



WHY QUIT?
SWITCH TO BLU

- Have the Freedom to Smoke Anywhere
- No Tobacco, No Ash, No Smell
- All Flavors Made in the U.S.A.



blu

Chesterfield
They're Milder - much Milder
It's MY cigarette
Lucille Ball
"Chesterfield always buys the highest quality mild, ripe tobacco. I find it's the best cigarette for me to smoke because I enjoy its taste and it's MILD."
H. P. Rasberry
RICHMOND, N.C.

Always Buy CHESTERFIELD

The Flavors



By law, traditional cigarettes can only be sold in two flavors: traditional tobacco & menthol
(these flavors are also available in e-cigarettes!)

The Shops

- Originally promoted and sold online
- Expanded to traditional outlet stores
 - e.g., gas stations, grocery stores
- PLUS independent retail specialty shops that sell only e-cigarettes & related products
 - Called vape shops or e-cigarette lounges
 - Opening around the world and across the US
 - Estimated 3,500 in the US



The Competition

- Contests: cloud competitions
- Competitors: cloud chasers
- Goal: exhale the largest cloud
 - Smoke clouds judged based on their density, distance, and girth
- Prizes: bragging rights and sometimes up to \$2,000
- Nationwide
- Growing subculture



What do we make of this?

Youth targeting:

- Advertisement content and locations target youth—between 2011 and 2013, e-cigarette TV advertisements that reached children increased by **256%** (RTI)
- Free samples are given away at events attended by youth (i.e. concerts)
- Flavors are appealing to youth

Growth of subculture

- It's offered as a fun, flavorful, and carefree experience...a safe alternative to cigarettes!



FUN: Conclusions

- The trends with e-cigarettes closely mirror those when traditional cigarettes entered the market. “Big Tobacco” companies (e.g. Phillip Morris) are now major producers of e-cigarettes and using much of the same tactics to increase use and bring in loyal customers that are now banned for traditional cigarettes:
 - Flavors
 - Television advertisements
 - Using celebrity spokespeople
 - Attractive advertising content (e.g. rugged men, glamorous women, SEX)
 - Sponsor events (e.g. car races, concerts)
 - “Switch, Don’t Quit”
 - Use cartoons

THE FALLASIES

Main Questions

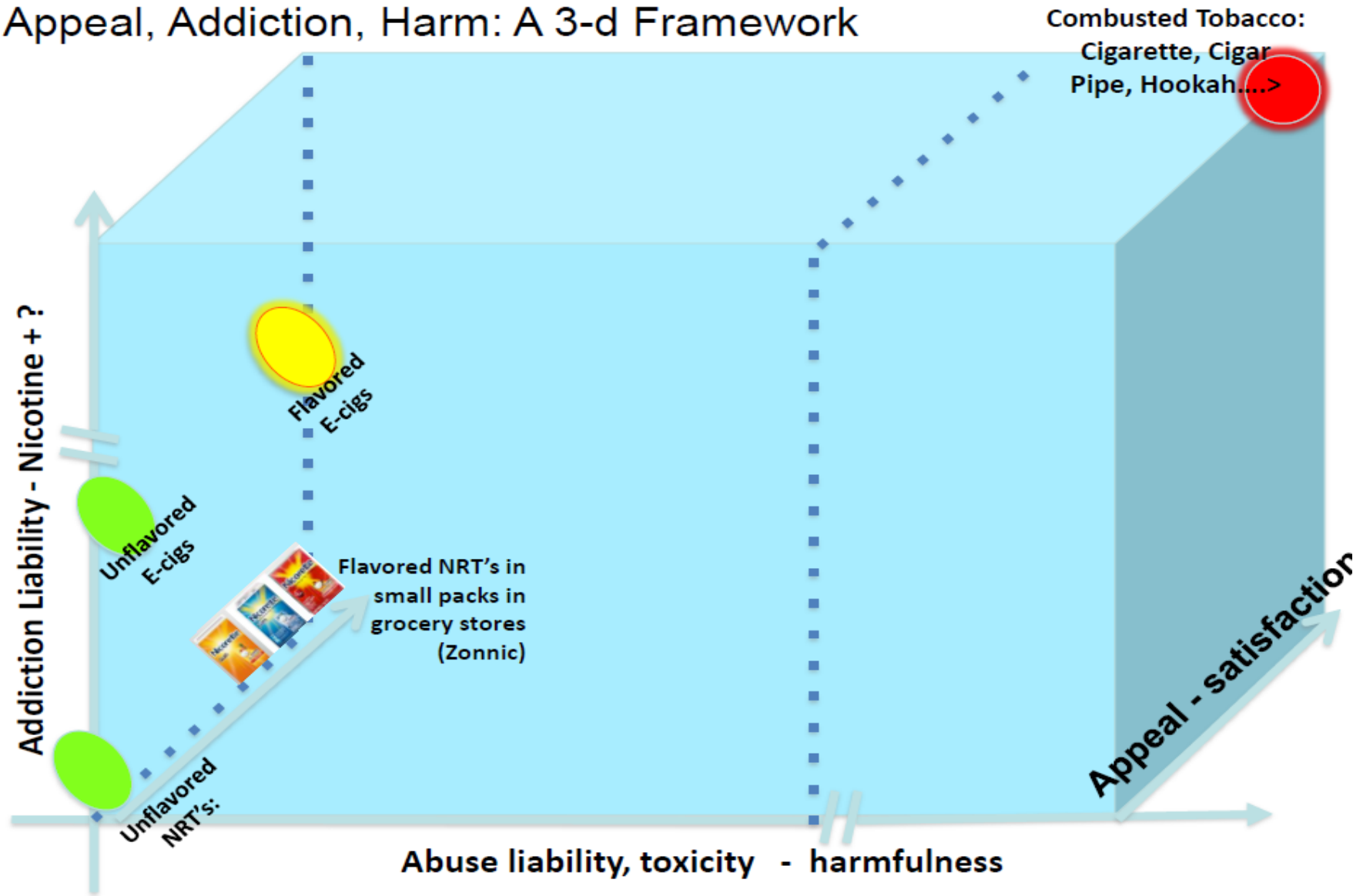
- ADDICTIVE?
- SAFE?
- PROMOTE YOUTH INITIATION?
- PROMOTE CESSATION?



Are E-cigarettes **Addictive**?

Addictive?

Appeal, Addiction, Harm: A 3-d Framework



Are E-cigarettes **Safe**?

Safe?

Most people *believe* that e-cigarettes are safer...

- In a study examining the perceptions of 6,607 adult smokers, e-cigarettes were viewed as less likely than regular cigarettes to cause:
 - Lung cancer
 - Oral cancer
 - Heart disease
- These beliefs likely contribute to the increase in e-cigarettes' popularity

Safe?

Table 1. Levels of Toxicants in E-Cigarette Aerosol Compared With Nicotine Inhaler and Cigarette Smoke

Toxicant	Range in Content in Aerosol From 12 E-Cigarette Samples per 15 Puffs*	Range in Content in Conventional Cigarette Micrograms in Mainstream Smoke From 1 Cigarette	Content in Nicotine Inhaler Mist per 15 Puffs*
Formaldehyde, µg	0.2–5.61	1.6–52	0.2
Acetaldehyde, µg	0.11–1.36	52–140	0.11
Acrolein, µg	0.07–4.19	2.4–62	ND
o-Methylbenzaldehyde, µg	0.13–0.71	...	0.07
Toluene, µg	ND–0.63	8.3–70	ND
p,m-xylene, µg	ND–0.2	...	ND
NNN, ng	ND–0.00043	0.0005–0.19	ND
NNK, ng	ND–0.00283	0.012–0.11	ND
Cadmium, ng	ND–0.022	...	0.003
Nickel, ng	0.011–0.029	...	0.019
Lead, ng	0.003–0.057	...	0.004

Prepared using data from Goniewicz et al.⁴¹ E-cigarette indicates electronic cigarette; and ND, not determined.

(Grana, Benowitz, & Glantz, 2014)

Safe?

- Propylene glycol & glycerin are the main base ingredients of e-cigarette liquid
- Propylene glycol effects:
 - Short-term exposure can cause eye & respiratory irritation
 - Large amounts over long periods of time may affect the central nervous system, behavior, & spleen
- When heated & vaporized, propylene glycol can form **cancer causing agents**
- When heated & vaporized, glycerin can cause upper respiratory tract infection



Safe?

Short Term

- Negative Effects:
 - Mouth irritation, throat irritation, & dry cough at initial use—though complaints decreased with continuing use
 - Restricted airways similar to cigarette use
- No negative impact on the following:
 - Heart rate, carbon monoxide (CO) level, or nicotine levels in the blood
 - Lung function
 - Cardiac function
 - Immune function

****Nicotine content varied of the e-cigarettes and was 1.2 fold higher than claimed by manufacturer**

Safe?

Long Term

- Bottom Line: More research is still needed to determine the lasting health effects of e-cigarettes.
 - Currently available studies only have data on the short-term health effects
 - Studies evaluating whether e-cigarettes are less harmful than cigarettes are inconclusive
 - Long-term biological effects are unknown at this time because e-cigarettes have not been in widespread use long enough for assessment

Safe?

Unorthodox e-cigarette use = dripping e-cig liquid directly onto the heater coil (“direct drip atomizers” or DDAs)

- Why do some people do this?
 - Reportedly, for greater vapor production & “throat hit”
- Potential added dangers:
 - May result in significantly elevated toxicant exposure due to the higher temperatures applied to the e-cig juice

Safe?

Second Hand Vapor

- Some research suggests that e-cigarettes may release pollutants that are harmful
 - 6 vaping sessions, 9 volunteers
 - Consumed e-cigarettes with and without nicotine in ventilated rooms for 2 hrs
 - Researchers analyzed the levels of e-cigarette pollutants in the room
- Results
 - There was an increase in chemicals found in the air after vaping, including 20% increase in cancer causing chemicals.

Do E-cigarettes Promote **Youth** **Initiation?**

Youth Initiation?

We know many youth are trying E-cigarettes

- Among **high school** students, e-cigarette use almost tripled (4.5% to 13.4%)
- Among **middle school** students, e-cigarette over tripled (1.1% to 3.9%)
- E-cigarette use now surpasses rates of any other tobacco product used among youth

Do these youth then smoke cigarettes?

- Data from National Youth Tobacco Survey from Middle and High School students
- Examined e-cigarette use and conventional cigarette smoking
- Students who used e-cigarettes were:
 - More likely to have ever tried or currently smoke cigarettes
 - More likely to become a chronic smoker
 - More likely to plan to quit (if a current smoker)
 - Less likely to be abstinent from cigarettes (if experimenting with e-cigarettes)

Do E-cigarettes Promote **Cessation**?

Promote Cessation?

- In a study that followed 367 e-cigarette users over 1 year found:
 - Current e-cigarette AND cigarette users:
 - 22% had stopped smoking cigarettes at **1 month**
 - 46% had stopped smoking at **1 year**
 - Current e-cigarette AND former cigarette users:
 - 6% had relapsed to smoking after **1 month**
 - 6% had relapsed at **1 year**
 - Almost all the daily vapers continued to vape daily after **1 month** (98%) and **1 year** (89%)
- The authors concluded that e-cigarettes may contribute to relapse prevention in former smokers and smoking cessation in current smokers

Promote Cessation?

Compared with smokers who never used e-cigarettes, smokers using e-cigarettes were found to be:

- *Less* likely to quit smoking for 30 days or more
- *Less* likely to reduce cigarette consumption

However, there is *some* evidence suggesting that smokers using e-cigarettes were *more* likely to report a quit attempt.



Promote Cessation?

- Review of multiple studies of current smokers using e-cigarettes
- Results suggest:
 - E-cigarettes can help smokers to quit long-term compared to a placebo
- But there are only a small number of studies with mixed results!
 - Therefore, confidence in these results is rather low
 - E-cigarettes may not be better than other NRT
 - E-cigarettes show promise in helping smokers who are unable to quit cut back when compared with a placebo or patch

Promote Cessation?

INDEPENDENT FROM BIG TOBACCO

NJOY is America's largest independent e-cigarette and vaping company. Our mission is to obsolete combustible cigarettes completely. We are not owned by Big Tobacco and we never will be. We believe that the vaping and e-cigarette industry can change the world and we are proud to stand with our customers and partners to take part in the movement.



- Consider the manufacturer....
 - NJOY does not offer flavors as a part of their e-cigarette
 - To avoid appealing to youth
 - Promote cessation from regular tobacco products

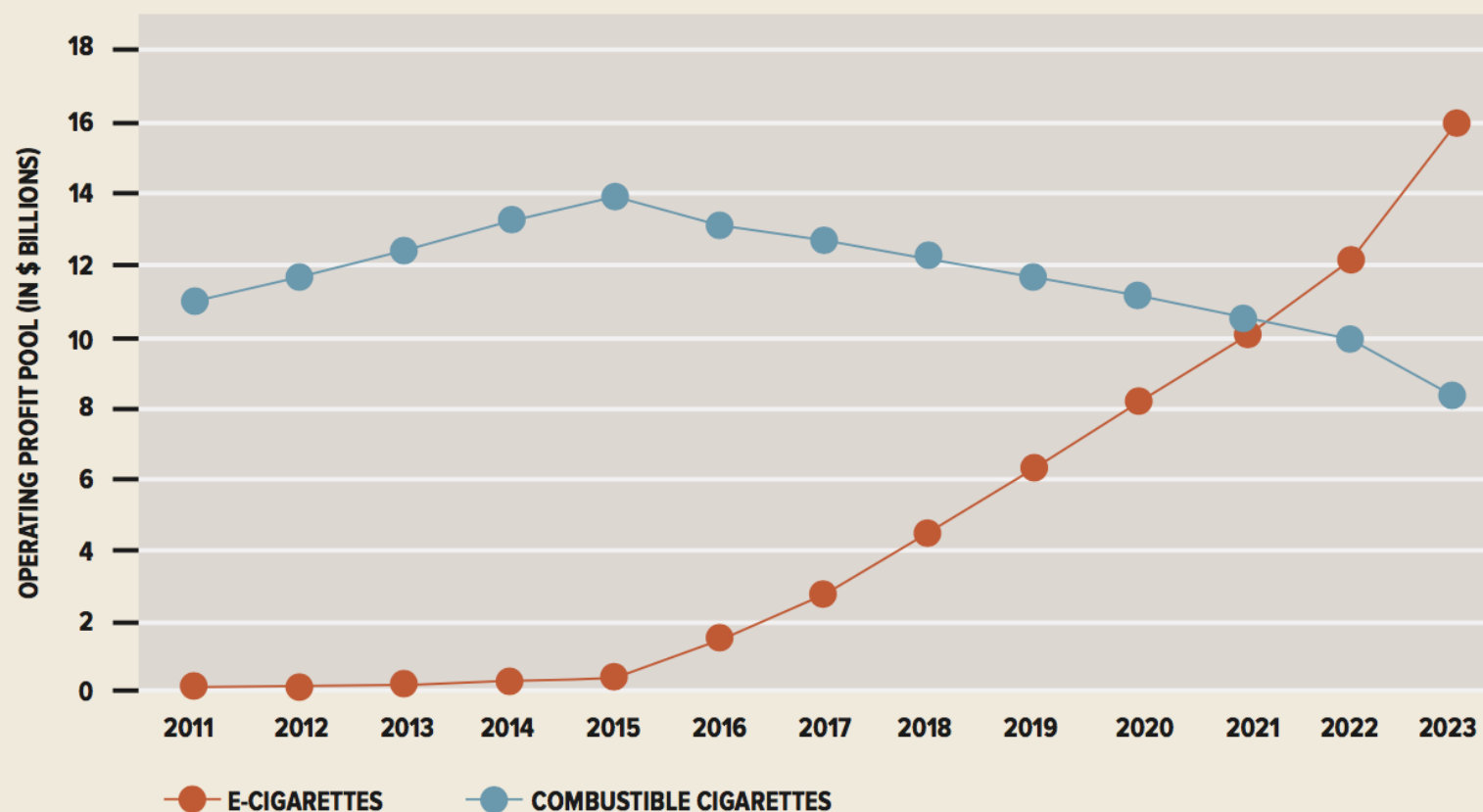
FALLACIES: Conclusions

- E-cigarettes are addictive and not harmless
 - They contain nicotine and therefore can be abused
 - There are various chemicals in e-cigarettes that are necessary for them to function—these chemicals can be dangerous, particularly when heated
- Youth are starting to use e-cigarettes at alarming rates, some may be then initiating use of cigarettes and other forms of tobacco
- Some people successfully quit tobacco using e-cigarettes but there is not yet evidence to suggest that e-cigarettes are more effective than NRT
 - NRT do not contain the other chemicals that are found in e-cigarettes

THE FUTURE

Changing the Cigarette Industry

E-CIGARETTE PROFITS COULD SURPASS THOSE OF
COMBUSTIBLE CIGARETTES WITHIN 10 YEARS



Source: Company data and Wells Fargo Securities LLC estimates. Data for 2011–2013 are actual. Data for 2014–2023 are estimated.

Current Regulations: Federal

FDA's 2014 Regulations include:

- Restricting sale to minors
- Mandating ingredient disclosure
- Requiring warning labels



Current Regulations: State and Local

States and local governments can make strides to regulate e-cigarettes in the absence of federal regulations.

States that include smoking of e-cigarettes under existing laws prohibiting smoking in public:

- Arkansas
- New Jersey
- North Dakota
- Utah
- District of Columbia

Other states prohibit vaping in schools and other public locations

Nearly 300 cities and counties have banned e-cigarettes in restaurants, workplaces, and casinos.

Current Regulations: Are They Enough?

While purchasing e-cigarettes in stores requires a legal form of identification, verifying age, there are minimal restrictions to buying e-cigarettes online



Future Federal E-cigarette Regulations:

- Regulating advertisements
- Banning flavors
- Limiting public vaping
- Implementing product standards

...but first, more RESEARCH is needed!

Currently the National Institutes of Health (NIH) is calling for research proposals to investigate the long-term effects of e-cigarettes.

FUTURE: Conclusions

- Given the popularity of e-cigarettes and the expected increase in future prevalence, there is a need for additional regulations
- Additional federal regulations are on the horizon, given the appropriate research is conducted
- In the meantime, states and local municipalities can work to implement smoke-free regulations that include e-cigarettes

So what can we do **now**?

What do you tell the clients at your agency about E-cigarettes & cessation?

If a patient wishes to use e-cigarettes to aid quitting...

- Support their decision to make a quit attempt!
- With permission, provide the following information:
 - There are multiple effective cessation aids that have been **approved by the FDA** available: NRT, varenicline, & bupropion
 - Free telephone quit counseling is available thorough 1-800-QUIT NOW
 - Although e-cigarettes is likely less toxic than cigarette smoking, the products are NOT regulated by the FDA, contain toxic chemicals, and have not been proven to be effective cessation devices
- Because there are no long-term safety studies of e-cig use, patients should be encouraged to set a quit date for their e-cigarette use and not plan to use it indefinitely

In your agency....

- What is your current policy on smoking?
- What about e-cigarettes?
- What would you recommend as e-cigarette policies now?